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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Juergen Claus

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EXAMINER

MCAHON, MARGUERITE J

ART UNIT

PAPER NUMBER

3741

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/579,189	Applicant(s) CLAUS ET AL.	
	Examiner Marguerite J. McMahon	Art Unit 3741	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-30 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 13-30 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Specification

The disclosure is objected to because of the following informalities: Canceled claim 9 is referenced on page 3.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 25 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 25 depends on canceled claim 12, and in lines 2-3 of claim 25 it is unclear whether the thermal coefficient of expansion referred to is that of the additive or the highly thermally stressed area.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 13-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamimura et al (5,321,224). Note a process for production of an aluminum alloy component of an internal combustion engine (see column 1, lines 12-20), which includes at least one area, which during operation of the engine is thermally higher

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loaded than another area, comprising melting that area by means of a laser beam process, introducing an additive into the melt pool, the additive being either a ceramic material, such as SiC or Al_2O_3 , or an inter-metallic compound (see col. 6, lines 15-20) or a powder (see col. 5, line 26) and having a thermal coefficient of expansion slower than the aluminum alloy, resolidifying the melt pool to develop in the thermal higher loaded area a lower thermal coefficient of expansion relative to the thermal lower loaded area, wherein the component is the portion in the cylinder head between the valve bores (see Figure 12) or the component is a piston, wherein the portion is a recess edge (see Figure 13).

Kamimura et al show everything except specifically citing that during operation of the engine, an even expansion occurs in the thermally higher loaded area relative to said another area, the additive thermal coefficient of expansion being below or equal that of the surrounding area, and wherein the inter-metallic compound is in the form of an intra-metallic dispersion such as Al-Fe-Zr/Ce or the ceramic material is in the form of bristles or powder.

The instant invention and the Kamimura et al reference are both solving the problem of cracking occurring in areas which are highly thermally loaded. In order to eliminate cracking due to the differentiation of expansion in the areas which are more highly thermally loaded, an amount of additive is added which has a lower thermal coefficient of expansion. It would have been obvious to one having ordinary skill to optimize the amount of additive such that the coefficient of expansion in the highly stressed area is equal or less than that of the less stressed area and an even expansion

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occurs, in order to eliminate cracking, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d, 205 USPQ 215 (CCPA 1980).

In addition, it would have been an obvious matter of design choice to employ an intra-metallic dispersion such as Al-Fe-Zr/Ce or the ceramic material is in the form of bristles or powder, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Response to Arguments

Applicant's arguments filed 12/11/08 have been fully considered but they are not persuasive.

Applicant argues that the reference treats the symptom by putting a patch on the surface of the component whereas the instant invention cures the source of the problem. This argument is misleading because the reference shows the same process as that claimed in the claims and is solving the same problem.

Applicant argues that the reference does not teach adding any additive which is not at least predominantly metal. This is untrue. The reference teaches the use of a ceramic additive such as SiC or Al₂O₃ (see col. 3, lines 36-40, or col. 6, lines 15-18).

Applicant argues that new claim recites the deliberate steps of determining the area of higher thermal loading, selecting an additive with a low thermal coefficient of expansion, determining a sufficient amount of additive to reduce the tCE of said area with higher thermal loading to approximately that of said bordering area, melting that

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area which is thermally higher loaded, introducing said sufficient amount of ceramic material in the form of bristles of powder as an additive into the melt pool

Applicant argues that the reference shows only **surface** modifying to make the component more heat resistant using a heat resistant metal, which metal may be in the form of a heat resistant wire with a cores with ceramic particles. There is nothing in the claim language to differentiate the area involved away from the surface of the component. Both the reference and the instant invention are working with the area at and just below the surface of the component, so Applicant's argument here is specious. Furthermore, Applicant refers to a couple of the embodiments shown by the reference as though the entire reference were limited to those particular embodiments. The reference discloses six embodiments, with different combinations of additives including metal and metal alloys, ceramics, in the form of powders, wires, and a core section optionally in the form of particles surrounded by other particles and/or sheathing.

Applicant cites a "seventh" aspect of the invention citing col.3 , line 25 of the reference and then goes on to assert that the reference only teaches surface modifying to make the component more heat resistant using a heat resistant metal, which metal may be in the form of a heat resistant wire with a core with ceramic particles.

The argument does not make sense. First, as explained above, the emphasis on the surface is not supported by the claim language, and the fact is that both the reference and the instant invention employ melting of the article to a certain depth, in order to integrate the additive into the material of the component. Note col. 2, lines 39-41, which cite "The seventh purpose of this invention resides in increasing the depth of

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the penetration in forming the alloy layer overlay.” Note that the use in the reference of the term overlay does not imply that the additive does not penetrate into the depth of the article. Second, the important factor in increasing the heat resistance is the fact that the additive has a lower thermal coefficient of expansion. Note that the thermal coefficient of aluminum or aluminum alloys (which the component is made of) ranges from 11.7 to 13.7 while that of Al_2O_3 is 8.1 and that of SiC is 4.0. Third, Applicant is attempting to limit the reference to one of its embodiments, rather than acknowledging the entire range of possible additives and the forms they come in that are disclosed by the reference.

Applicant further argues that the reference does not teach the deliberate steps of (a) determining the area in which there is higher heat loading, and (b) reducing the thermal coefficient of expansion (TCE) of the higher heat loaded area to generally match the TCE in the other area, such that thermal stress and heat cracks due to thermal stress are eliminated.

In fact, that is exactly what the reference does. See col. 1, lines 15-30 which cite “a cylinder head made of aluminum or cast iron casting should bear greater thermal load, as well as mechanical load as engine output increases, because its operating temperature reaches a considerably high temperature. Such an increase in load on the engine parts results in unexpected thermal cracking, as shown in FIG. 12, between an intake port 3 and an exhaust port 4 (referred herein as ‘intake part 6’, which is thinner than other portions), and between the intake part 6 and a fuel injection nozzle port 5 (or the preheater chamber port). In addition, as shown in FIG 13, a

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hatched portion 9 of a cylinder 7, which surrounds a combustion chamber 8 is also an object part since the hatched portions 9 bear a considerably high load.” See also col. 2, lines which cite “The primary purpose of this invention resides in markedly increasing the amount of the heat resisting element or elements to be added (the ‘additive’) to modify the quality of the specified surface part (the ‘object’ part) of metallic articles so as to improve their properties, for example, the resistance to thermal cracking.” Thus, the reference selects portions of the metallic object which are subject to high thermal stress and modifies them according to its method of melting the area and introducing an additive which has a lower thermal coefficient of expansion.

It is true that the reference does not appear to appreciate that the mechanism behind the improved heat resistance and resistance to cracking are due to the lower coefficient of thermal expansion of the additive. However, these are inherent properties of the invention disclosed by the reference. Applicant erroneously compares the situation to *Ex parte Viscardi*, 136 USPQ 382 in which the reference taught adding carbon dioxide to a printing press, but for a different reason than that of the instant invention. The difference between that situation and this situation is that in this situation both the reference and the instant invention are addressing the problem of cracking in highly thermally stressed areas. They are following the same process as that disclosed in the claims to solve the same problem. They are not solving different problems. The fact that the reference does not discuss the *mechanism* behind the effectiveness of the process, namely that the additive has a lower thermal coefficient of expansion than aluminum, the material from which the component is formed, does not imply a

patentable distinction in the instant invention. They are solving the same problem by employing the same process.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marguerite J. McMahon whose telephone number is 571-272-4848. The examiner can normally be reached on Monday- Friday, 10am-6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cuff can be reached on 571-272-6778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Marguerite McMahon
Primary Examiner
Art Unit 3741

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